

Service Manual



ORDER NO.
CRT1351

MULTI-CD/TUNER CONTROL CD PLAYER

DEX-M88RDS

EW

COMPACT
disc
DIGITAL AUDIO

- This additional service manual is designed to be used together with Model DEX-M88/US Service Manual (CRT1319). Refer to it for finding parts numbers, etc. which are not shown in this manual.

CONTENTS

1. SAFETY INFORMATION.....	2	5. CHASSIS EXPLODED VIEW.....	31
2. ADJUSTMENT.....	3	6. PACKING METHOD.....	31
3. SCHEMATIC CIRCUIT DIAGRAM.....	26	7. ELECTRICAL PARTS LIST.....	32
4. CONNECTION DIAGRAM.....	29		

PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan

PIONEER ELECTRONICS SERVICE INC. P.O. Box 1760, Long Beach, California 90801 U.S.A.

PIONEER ELECTRONICS OF CANADA, INC. 505 Cochrane Drive, Markham, Ontario L3R 8E3 Canada

PIONEER ELECTRONIC [EUROPE] N.V. Keetberglaan 1, 2740 Beveren, Belgium

PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia TEL: [03] 580-9911

© **PIONEER ELECTRONIC CORPORATION 1991**

FS FEB. 1991 Printed in Japan

1. SAFETY INFORMATION

1. Safety Precautions for those who Service this Unit.

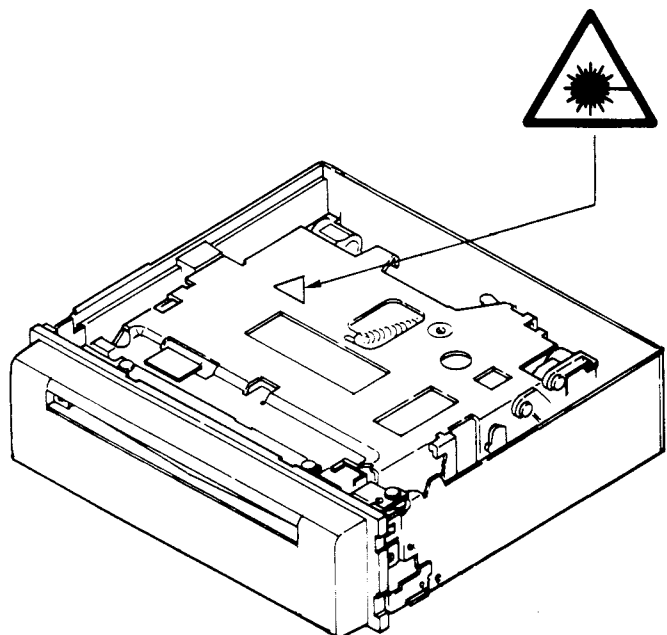
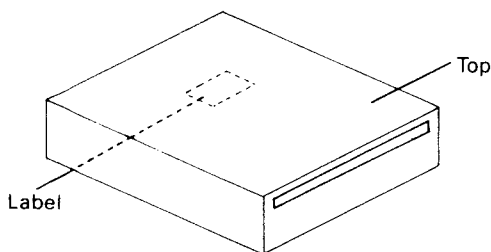
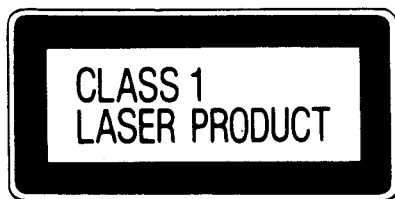
- Follow the adjustment steps (see pages 3 through 25) in the service manual when servicing this unit. When checking or adjusting the emitting power of the laser diode exercise caution in order to get safe, reliable results.

Caution:

1. During repair or tests, minimum distance of 13cm from the focus lens must be kept.
2. During repair or tests, do not view laser beam for 10 seconds or longer.

2. A "CLASS 1 LASER PRODUCT" label is affixed to the bottom of the player.

3. The triangular label is attached to the mechanism unit plate unit.



4. Specifications of Laser Diode

Specifications of laser radiation fields to which human access is possible during service.

- | | |
|---------------|--|
| Wavelength | = 780 nanometers |
| Radiant power | = 69.7 microwatts |
| | (Through a circular aperture stop having a diameter of 80 millimeters) |
| | 0.55 microwatts |
| | (Through a circular aperture stop having a diameter of 7 millimeters) |

2. ADJUSTMENT

1) Precautions

• This unit uses a single power supply (+5V) for the regulator. The signal reference potential, therefore, is connected to pin No.21 (approx. 2.5V) of IC 351 (CXA1081Q) instead of GND. (VC or VREF at test point)

If VC and GND are connected to each other by mistake during adjustments, not only will it be impossible to measure the potential correctly, but the servo will malfunction and a severe shock will be applied to the pick-up. To avoid this, take special note of the following.

Do not connect the negative probe of the measuring equipment to VC and GND together. It is especially important not to connect the channel 1 negative probe of the oscilloscope to VC with the channel 2 negative probe connected to GND.

And since the frame of the measuring instrument is usually at the same potential as the negative probe, change the frame of the measuring instrument to floating status.

If by accident VC comes in contact with GND, immediately switch the regulator or power OFF.

- Always make sure the regulator is OFF when connecting and disconnecting the various filters and wiring required for measurements.
- Before proceeding to further adjustments and measurements after switching regulator ON, let the player run for about one minute to allow the circuits to stabilize.
- Since the protective systems in the unit's software are rendered inoperative in test mode, be very careful to avoid mechanical and /or electrical shocks to the system when making adjustment.

• Test mode starting procedure

While pressing the 6 key and the RIGHT key, press CLEAR button.

• Test mode cancellation

Press the CLEAR button. (Or switch ACC, back-up OFF.)

- Disc detection during loading and eject operations is performed by means of a photo transistor in this unit. Consequently, if the inside of the unit is exposed to a strong light source when the outer casing is removed for repairs or adjustment, the following malfunctions may occur.

*During PLAY, even if the eject button is pressed, the disc will not be ejected and the unit will remain in the PLAY mode.

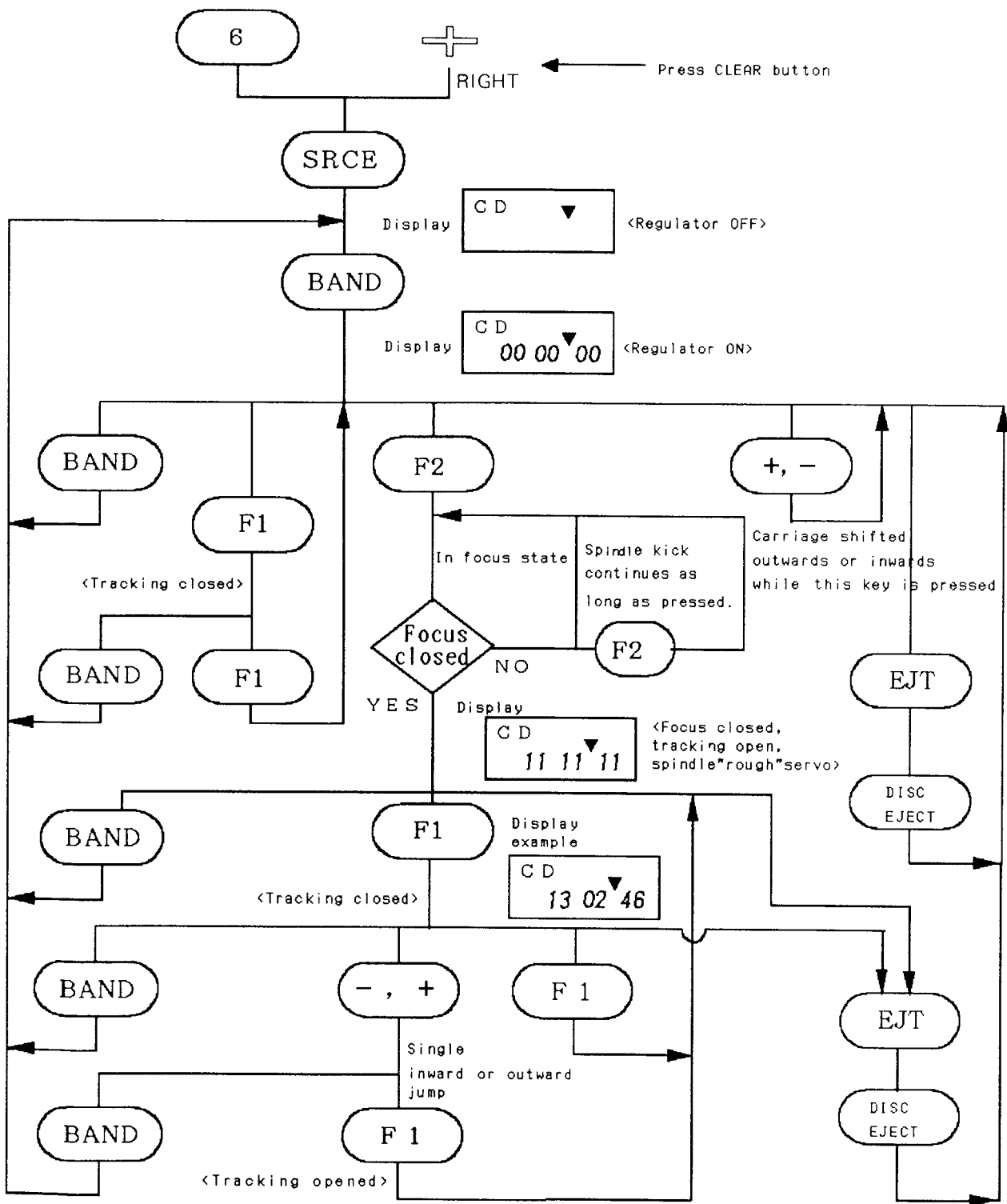
*The unit will not load a disc.

When the unit malfunctions this way, either re-position the light source, move the unit or cover the photo transistor.

Key	Function
BAND	Regulator ON/OFF
+	FWD Kick
-	REV Kick

Key	Function
F1	Tracking close
F1	Tracking open
F2	Focus close

- Flow Chart



Note:

After the EJT key has been pressed and until disc ejection is complete, do not press any key other than the EJT key. In the test mode, immediately turn off power if — or + key is pressed during focus search.

(There is a danger of actuator burnout with the lens bottoming or topping out.)

● Adjustment Point

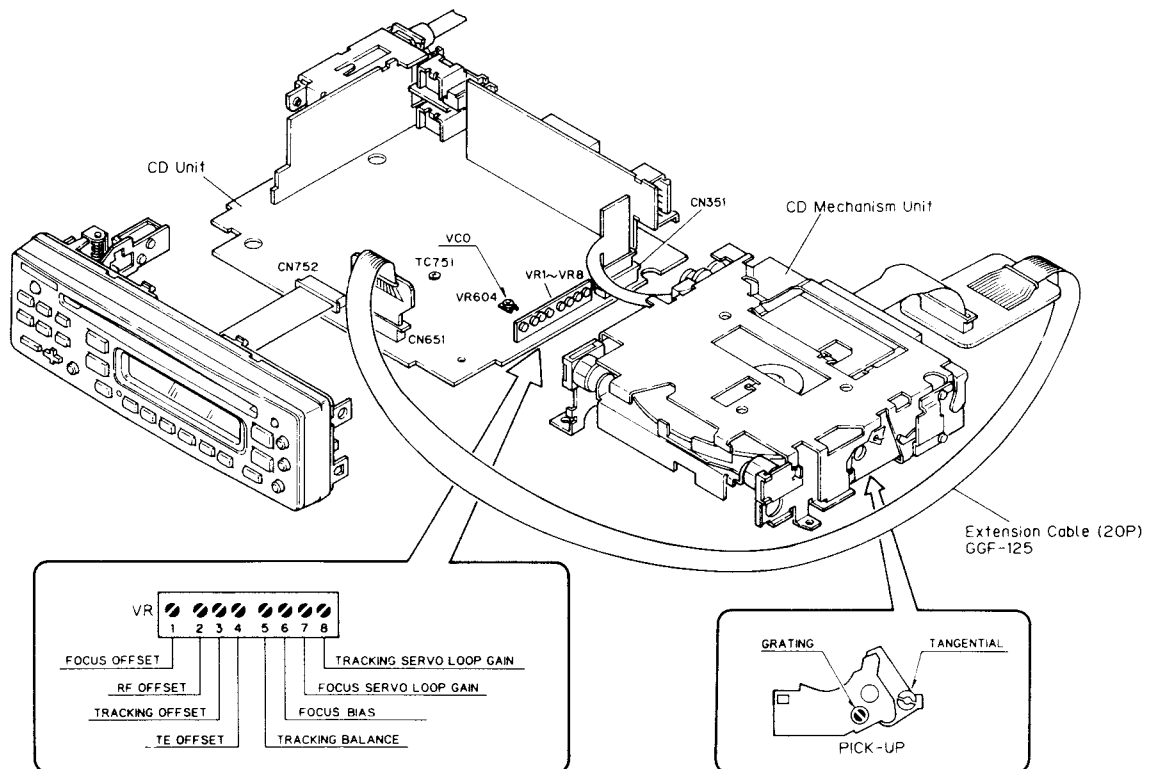


Fig. 1

- **Test Point**

CD Unit (Foil side)

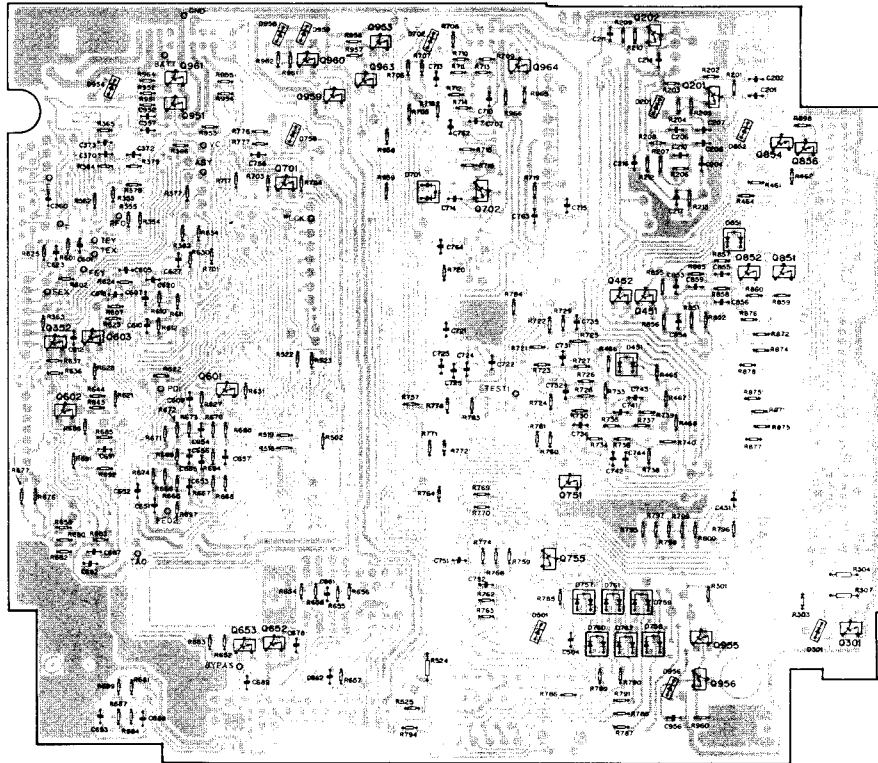


Fig. 2

CD Unit (Parts mounted side)

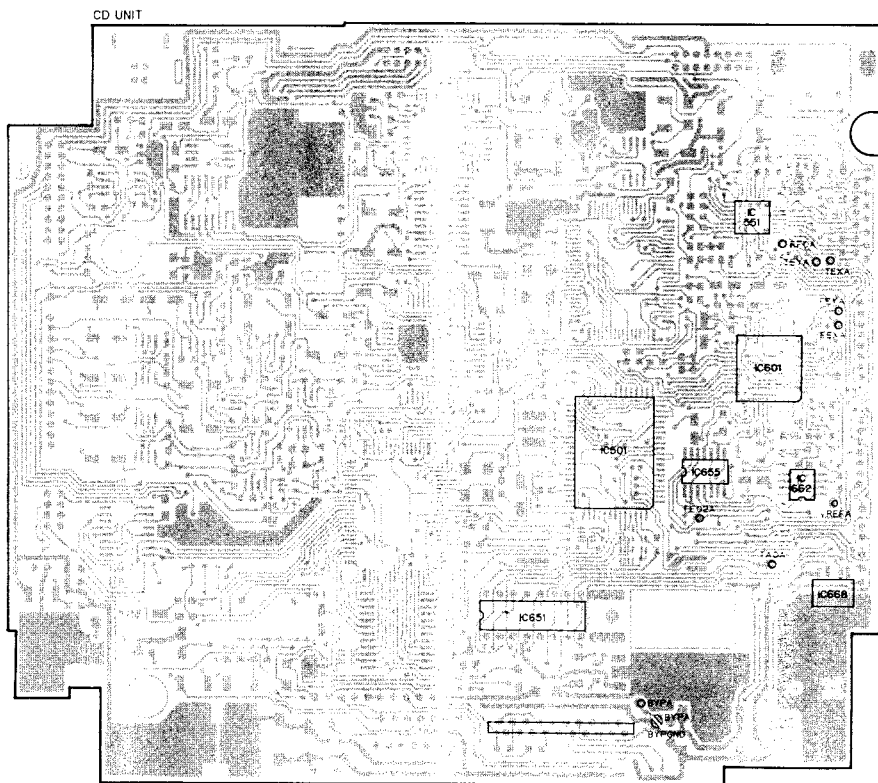


Fig. 3

• Test Point
CD Unit (Foil side)

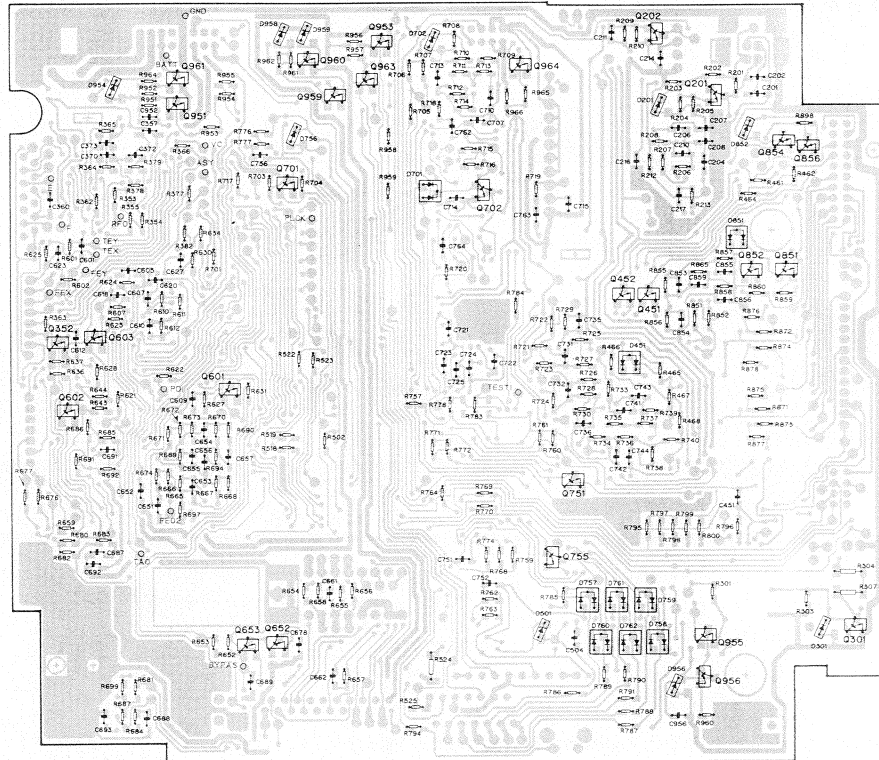


Fig. 2

CD Unit (Parts mounted side)

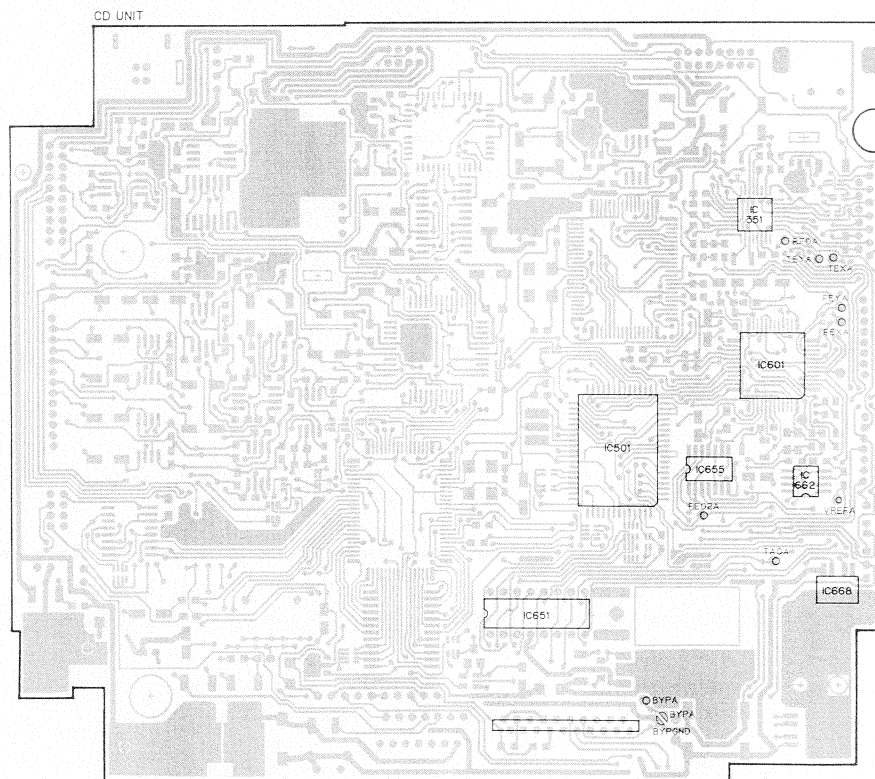


Fig. 3

2.1 Focus Offset Adjustment

● Purpose: To adjust the electrical offset of the focus amplifier to zero.

● Maladjustment symptoms: No focus closing

● Measuring equipment/
jigs

• Multi-meter or oscilloscope

● Measuring point

• FE02

● Test disc and setting

• No Disc

• Test mode

● Adjustment position

• VR1

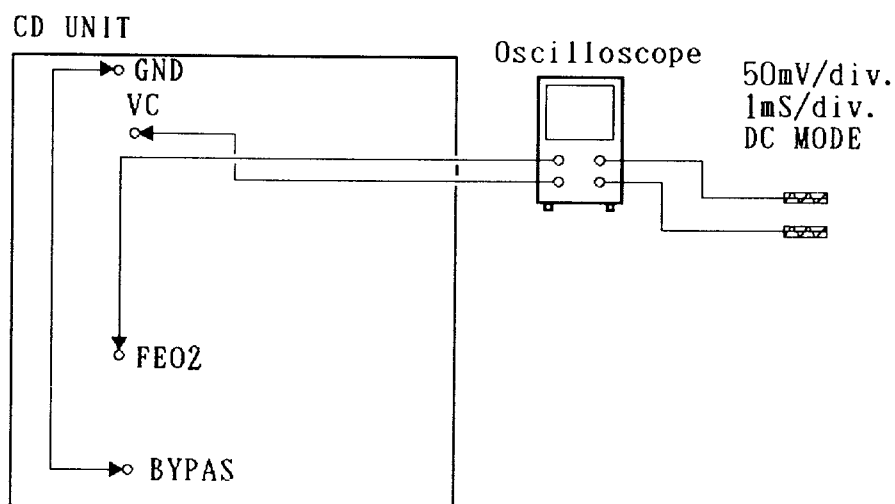


Fig. 4

(This P.C. Board connection diagram is viewed from the foil side.)

Adjustment Procedure

1. Connect BYPAS to GND. (or solder BYPA and BYPGND on the part mounted side)
2. Switch regulator ON.
3. Using VR1, adjust the FE02 DC voltage in reference to VC to a value of $0 \pm 25\text{mV}$.

2.2 VCO Free Run Frequency Adjustment

- Purpose: To adjust the EFM decoder reference clock free-run frequency to a suitable value
- Maladjustment symptoms: Spindle lock not possible, distorted sound or no sound at all

- | | |
|--|--|
| <ul style="list-style-type: none"> ● Measuring equipment/
jigs ● Measuring point ● Test disc and setting ● Adjustment position | <ul style="list-style-type: none"> • Frequency counter • Pin No. 70 (PLCK) of IC701 (CXD1167Q) • No Disc • Test mode • VR604 |
|--|--|

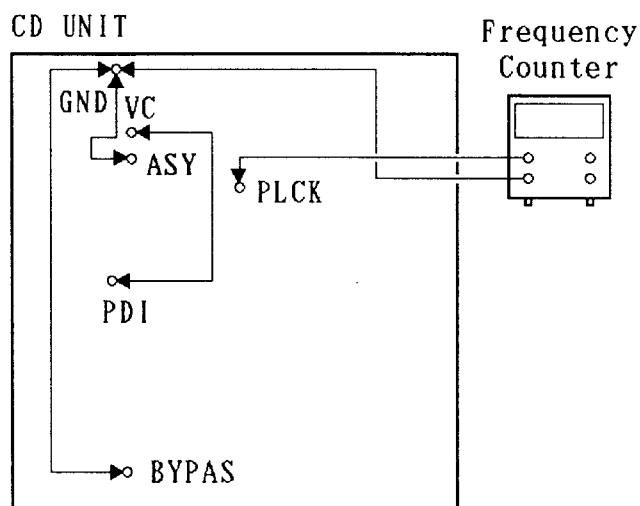


Fig. 5

Adjustment Procedure

1. Connect pin No. 7 (TP ASY) of IC351 to GND.
Connect BYPAS to GND.
 2. Connect pin No. 1 (TP VC) of IC601 to pin No. 28 (TP PDI).
 3. Switch regulator ON while in test mode.
 4. Connect the frequency counter to pin No. 70 (TP PLCK) of IC701 (CXD1167Q).
 5. Adjust VR604 to obtain a frequency of $4.45 \pm 0.01\text{MHz}$.
 6. Switch regulator OFF.
 7. Disconnect the leads connecting TP VC to TP PDI, and TP ASY to GND.
- Note: Connect TP VC and TP PDI with leads kept as short as possible.
- Note: Connect the frequency counter ground to TP GND as shown in the figure.

2.3 RF Offset Adjustment

● Purpose: To adjust the RF amplifier offset to a suitable value

● Maladjustment symptoms: Focus closure fails readily

● Measuring equipment/
jigs

● Measuring point

● Test disc and setting

● Adjustment position

• Oscilloscope

• RF0

• No Disc • Test mode

• VR2 (RF0)

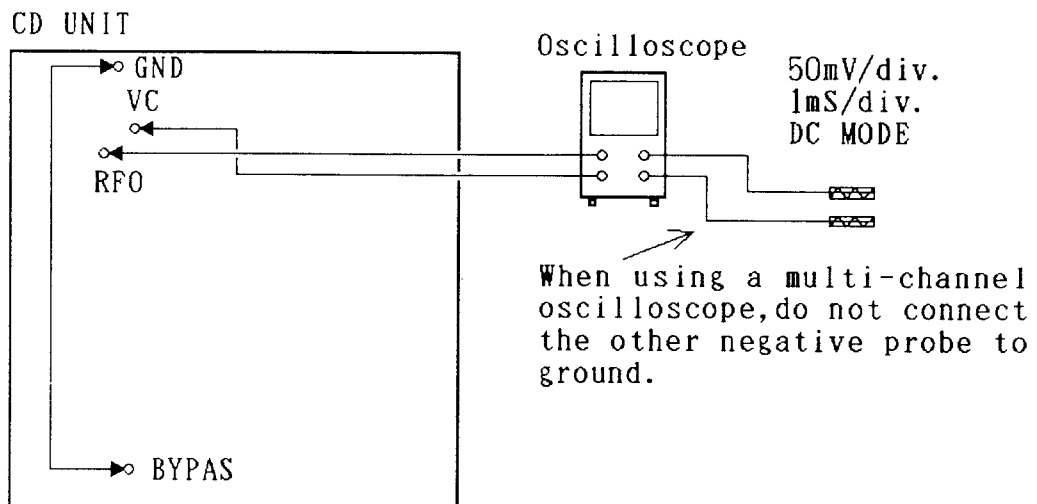


Fig. 6

Adjustment Procedure

1. Connect BYPAS to GND.
2. Switch regulator ON.
3. Using the oscilloscope, measure the RFO DC voltage in reference to VC, and adjust VR2 (RF0) to obtain a reading of $+40 \pm 10\text{mV}$.

2.4 Tracking Offset Adjustment

- Purpose: To adjust the electrical offset of the tracking amplifier to zero
- Maladjustment symptoms: Search times too long, carriage run-away

- | | |
|--|---|
| <ul style="list-style-type: none"> ● Measuring equipment/
jigs ● Measuring point ● Test disc and setting ● Adjustment position | <ul style="list-style-type: none"> • Oscilloscope • TAO low-pass filter output • No Disc • Test mode • VR3 (T0) |
|--|---|

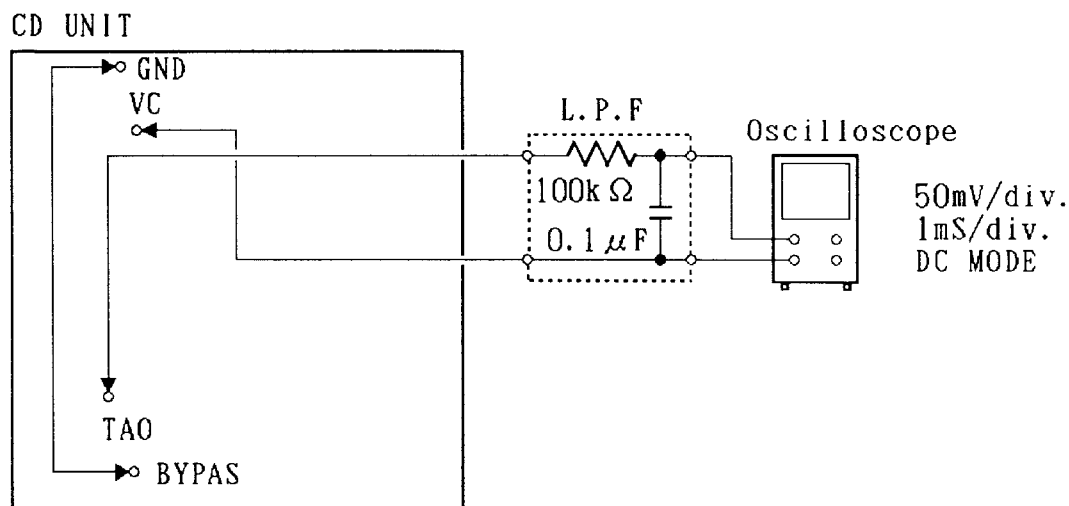


Fig. 7

Adjustment Procedure

1. Insert a low-pass filter between TAO and VC.
 2. Check that BYPAS is connected to GND.
 3. Switch regulator ON.
 4. Using the oscilloscope, measure the TAO LPF output DC voltage in reference to VC, and adjust VR3 (T0) to obtain a reading of 0 ± 25 mV.
- The low-pass filter may be left in place for later adjustments.

2.5 TE Offset Adjustment- I

● Purpose: To adjust the electrical offset of the tracking servo to zero.

● Maladjustment symptoms: Search times too long, carriage run-away

● Measuring equipment/
jigs

• DC voltmeter

● Measuring point

• TAO low-pass filter output

● Test disc and setting

• No Disc • Test mode

● Adjustment position

• VR4 (TE0)

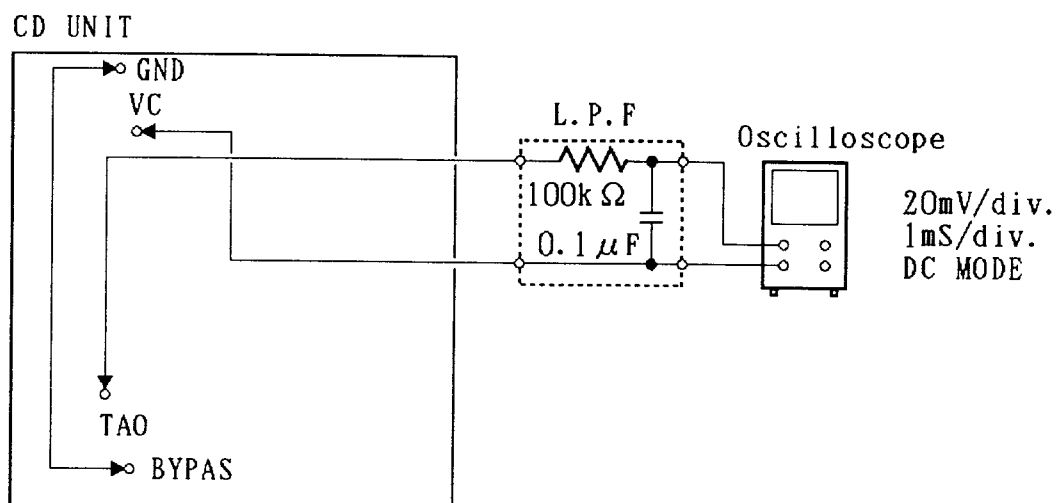


Fig. 8

Adjustment Procedure

1. Check that BYPAS is connected to GND.
2. Switch regulator ON while in test mode.
3. Press the F1 key to close tracking.
4. Using VR4 (TE0), adjust the TAO LPF output DC voltage in reference to VC to a value of $0 \pm 10\text{mV}$.
5. Switch regulator OFF.

2.6 Tracking Balance Adjustment- I

● Purpose: To adjust the tracking servo offset to zero.

● Maladjustment symptoms: Search times too long, poor playability, carriage run-away

● Measuring equipment/
jigs

● Measuring point

● Test disc and setting

● Adjustment position

• Oscilloscope

• TEY (Tracking error signal), low-pass filter output

• SONY TYPE 4 (or TYPE 3) • Test mode

• VR5 (T. BAL)

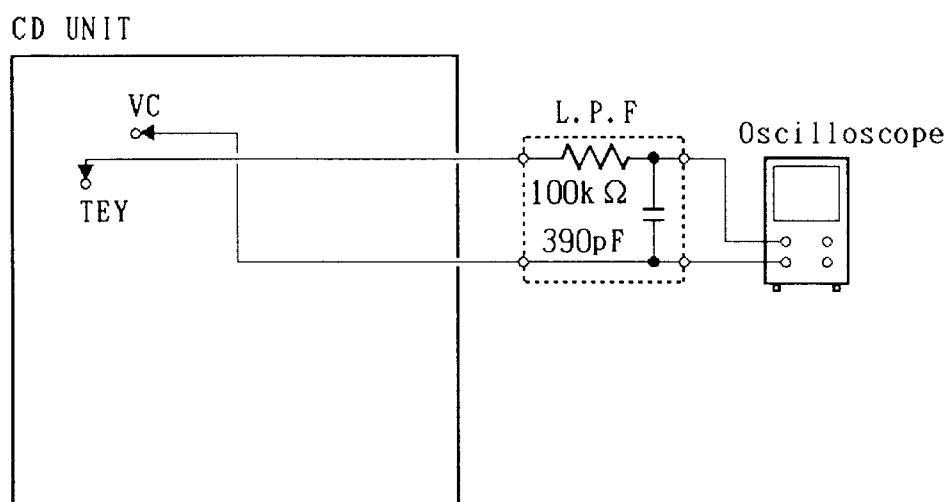
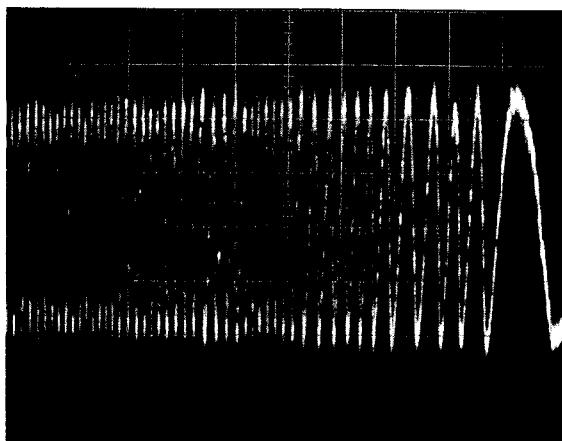


Fig. 9

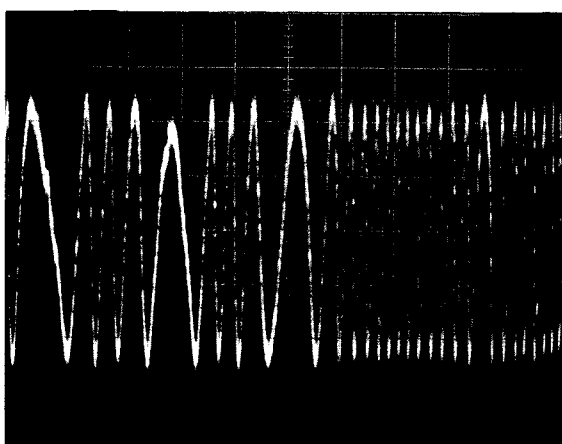
Adjustment Procedure

1. After checking that regulator is OFF, connect the low-pass filter as shown in the diagram.
 2. Disconnect BYPAS from ground.
 3. Set the test disc (SONY TYPE 4). Switch regulator ON.
 4. Using the + or - key, move the pick-up to about the center of the signal surface.
 5. Press the F2 key to close focus.
 6. Using an oscilloscope, observe the TEY signal in respect to VC. Then adjust VR5 (T. BAL) to set the positive and negative amplitudes to the same levels. (See Fig. 10-12)
 7. Switch the power OFF.
- The low-pass filter may be left in place for later adjustments.



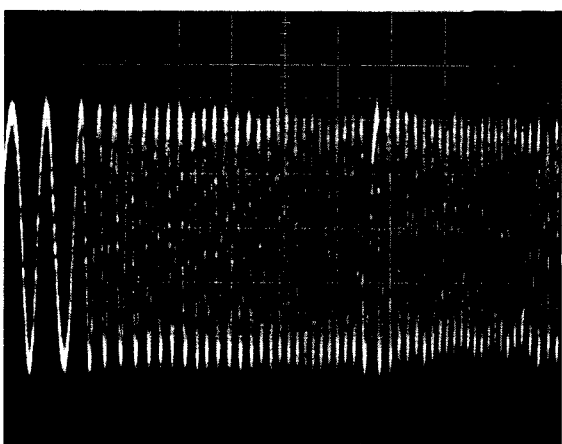
+ 5% NG

Fig. 10



± 0% OK

Fig. 11



- 5% NG

Fig. 12

10ms/div.
0.2V/div.
DC Mode

2.7 Tangential Skew Check

● Purpose: To check whether tangential skew has been misaligned or not when replacing the pick-up unit.

● Maladjustment symptoms: No disc playback; track jumping

● Measuring equipment/
jigs

● Measuring point

● Test disc and setting

● Adjustment position

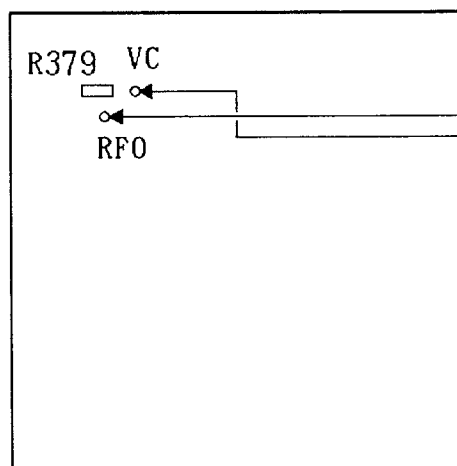
• Oscilloscope, screwdriver

• RFO

• SONY TYPE 4 (or TYPE 3) • Normal mode

• Pick-up tangential adjustment screw

CD UNIT



Oscilloscope

0.5 μ S/div.

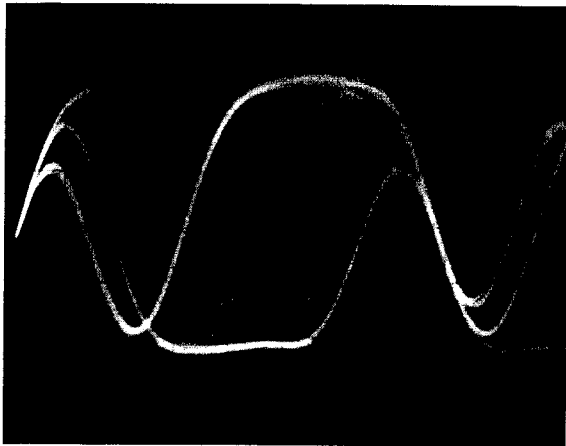
0.2V/div.

AC MODE

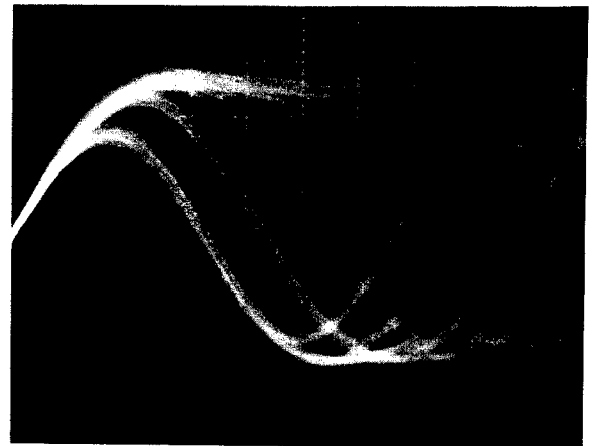
Fig. 13

Adjustment Procedure (with R379 removed)

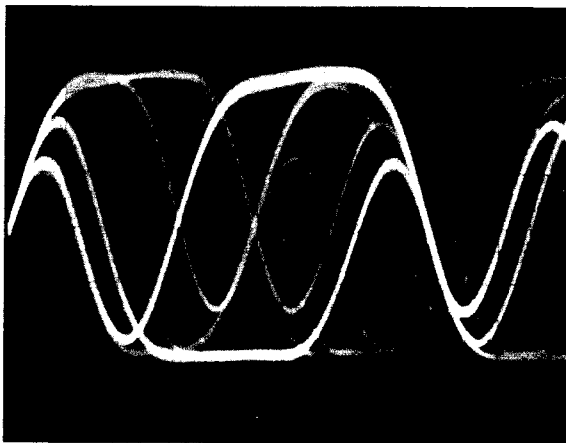
1. Remove R379 (but reconnect after completing adjustment).
2. Play tune TNO 7 in normal mode. (TYPE 3: TNO 23)
3. Check that the valley at the 11T section of the RF waveform is flat.
4. If out of adjustment, readjust to obtain a flat RF waveform. (See Fig. 14-19) Take care not to knock the pick-up with the screwdriver at this stage. (This kind of accident can result in loss of focus.)
5. Switch the power OFF and reconnect R379.
6. Apply "screw-lock" to the tangential adjustment screw.
7. After adjusting tangential skew, also adjust the grating.
8. If tangential skew is seriously out of adjustment, carriage stopping and run-away tend to occur in normal mode. In this case,
 - a) Switch to test mode,
 - b) Shift the pick-up to signal surface center using + or - key,
 - c) Press the F2 key to close focus.
 - d) Press the F1 key to close tracking.
 - e) Observe RFO in respect to VC, and turn the tangential adjustment screw to obtain a flat waveform at the 11T section.
 - f) Repeat the adjustment resuming from step 2.



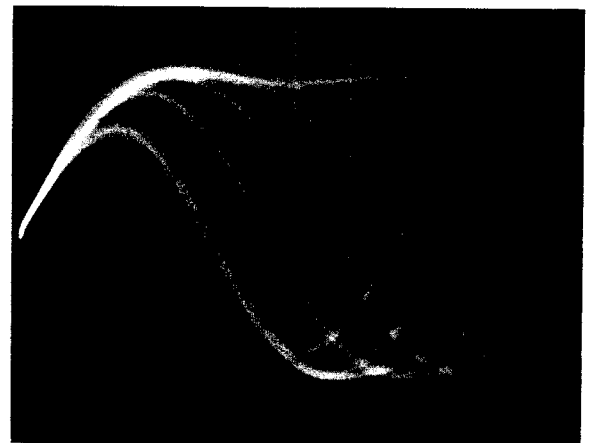
NG Fig. 14



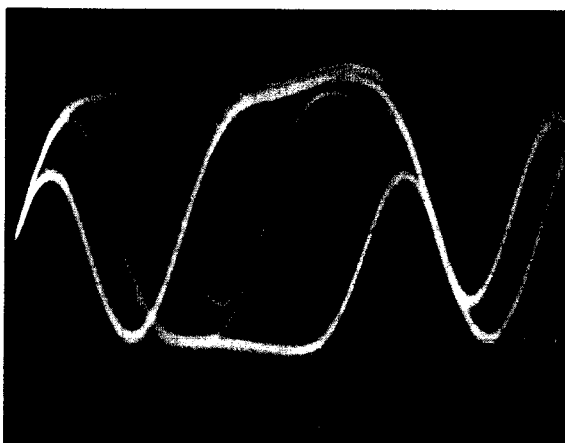
NG Fig. 15



OK Fig. 16

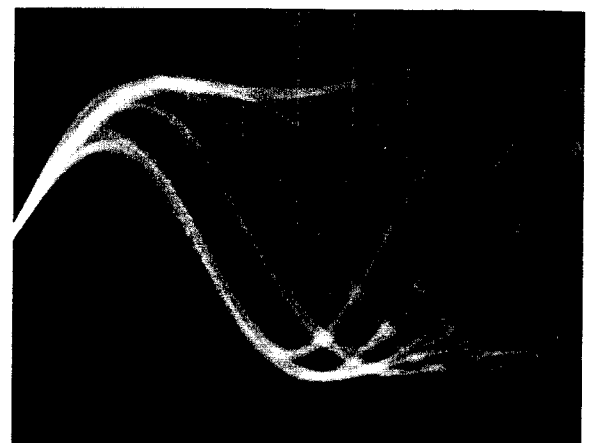


OK Fig. 17



NG Fig. 18

Play tune TN0 7 (TYPE4)

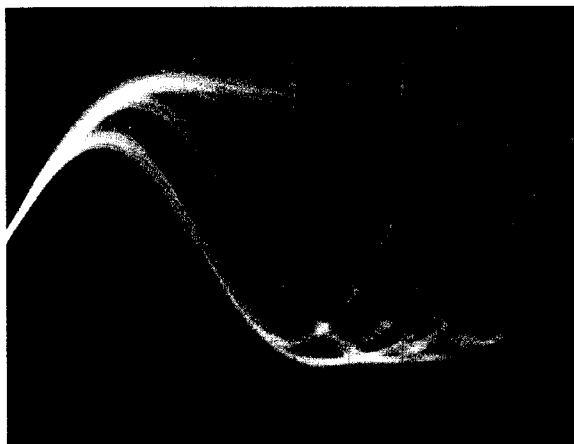


NG Fig. 19

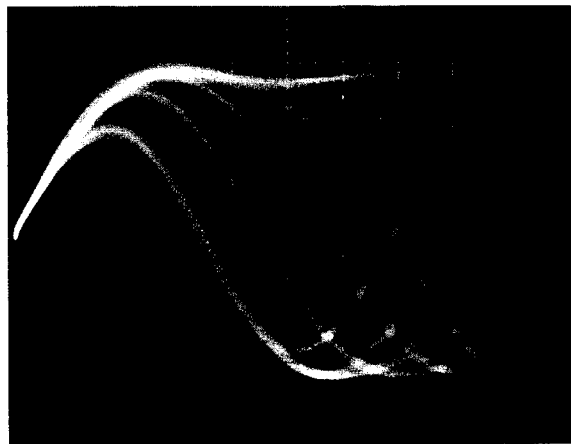
Play tune TN0 12 (TYPE4)

Adjustment Procedure (without R379 removed)

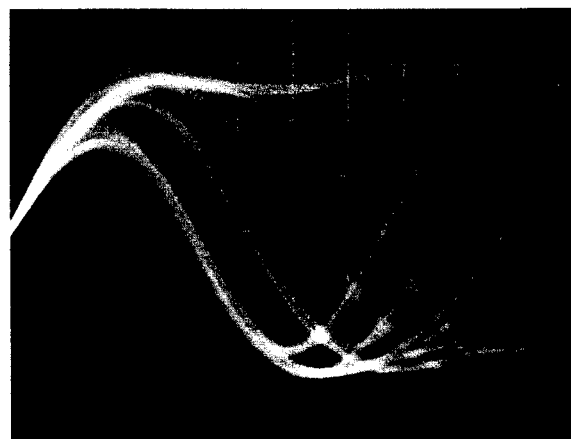
1. Play tune TNO 12 in normal mode. (TYPE 3:TNO 14)
2. Turn the tangential adjustment screw to obtain a good RF waveform eye pattern. Turn the adjustment screw both clockwise and counterclockwise to points where the eye pattern deteriorates, and take the midway point as the adjustment point. As a general guide, look for an overall clear waveform, and one of the diamond shapes in the eye pattern. The diamond shapes should appear in fine lines at the point of optimum adjustment. Take care not to knock the pick-up with the screwdriver at this stage. (This kind of accident can result in loss of focus.) (See Fig. 20-22)
3. Apply "screw-lock" to the tangential adjustment screw.
4. After adjusting tangential skew, also adjust the grating.



NG Fig. 20



OK Fig. 21



NG Fig. 22

2.8 Grating Adjustment

● Purpose: The grating may need adjustment in a replaced pick-up assembly.

● Maladjustment symptoms: No disc playback; track jumping

● Measuring equipment/
jigs

● Measuring point

● Test disc and setting

● Adjustment position

- Oscilloscope, clock driver, grating adjustment filter (bandpass filter) (GGF-133), AC millivoltmeter, two low-pass filters
- TEY, E LPF output, F LPF output
- SONY TYPE 4 (or TYPE 3) • Test mode
- Pick-up grating adjustment hole

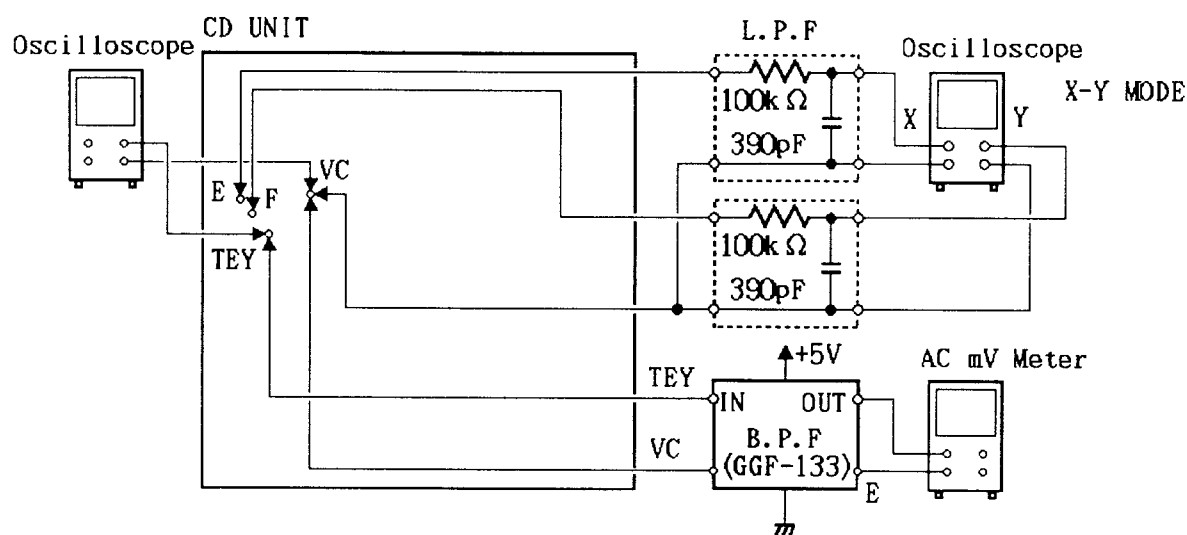


Fig. 23

Adjustment Procedure

1. Connect a low-pass filter (100k, 390p) to test points E, F, and VC as shown in the above diagram.
2. Switch regulator ON in test mode, and load a disc.
3. Press the F2 key to close focus.
4. Press the F1 key to close tracking.
5. Using the + or - key, move the pick-up to about the center of the signal surface (tune TNO 6). (TYPE 3: TNO 7)
6. Press the F1 key to open tracking.
7. While monitoring the TEY filter output by AC milli-voltmeter, turn the grating adjustment hole slowly. The AC voltage increases and decreases while turning the screw. Search for the minimum voltage level. (This corresponds to the position where the grating is on a track, and is referred to as the null point.)
8. Then while monitoring TEY by oscilloscope, turn the driver slowly clockwise from the null point (as seen from under the pick-up) until the first waveform peak amplitude is reached. (See Fig. 25-30)

9. With the E low-pass filter output connected to the X axis of the oscilloscope, and the F low-pass filter output connected to the Y axis, apply an input in AC mode and observe the Lissajous figures.
10. Using the driver, adjust the Lissajous figure to a single line (or as close as possible)
11. Switch regulator OFF and remove the filters.

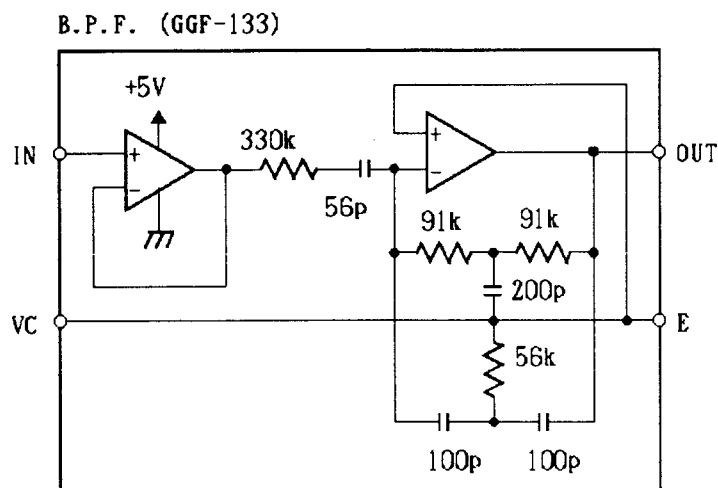


Fig. 24

TEY waveform 10ms/div, 500mV/div

Null Point

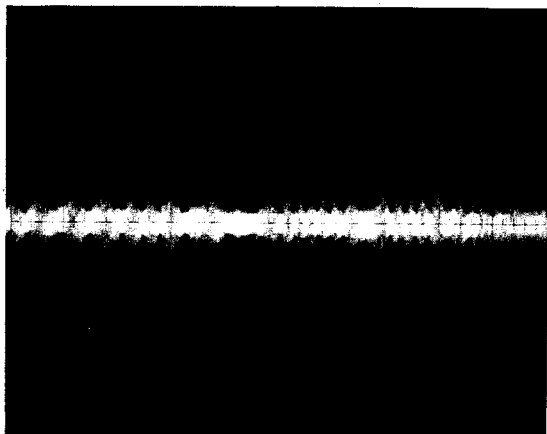
Lissajous figure (AC input)
Horizontal axis E 20mV/div
Vertical axis F 20mV/div

Fig. 25

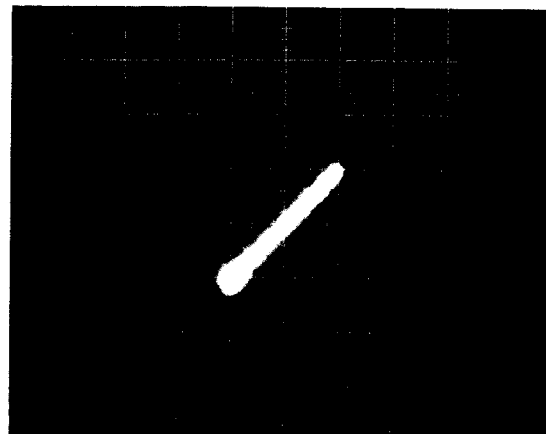


Fig. 26



"Rough" adjustment

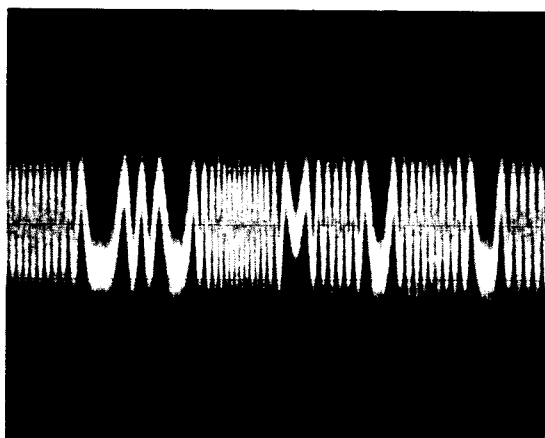


Fig. 27

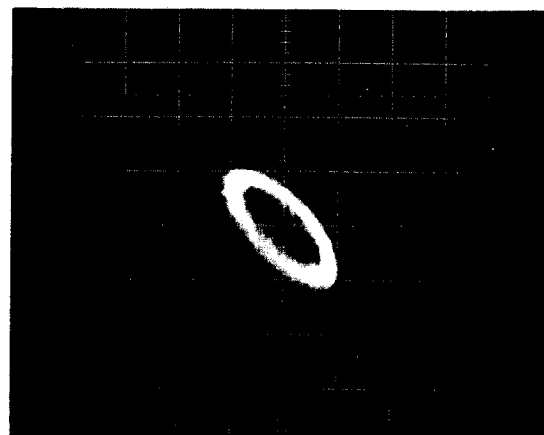


Fig. 28



Final adjustment

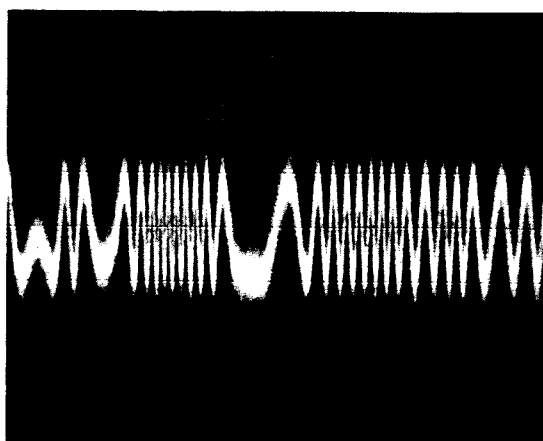


Fig. 29

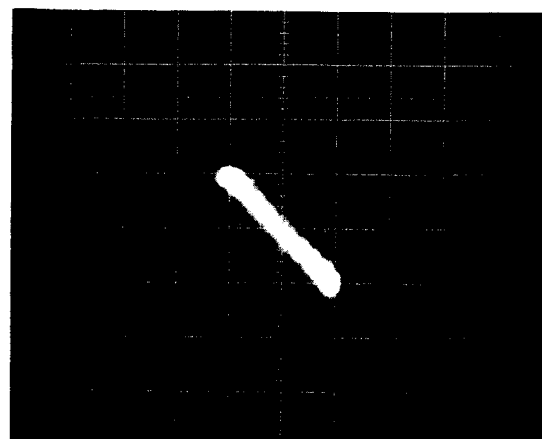


Fig. 30

2.9 Focus Bias Adjustment

- Purpose: To adjust the focus servo bias to an optimum value
- Maladjustment symptoms: Focus closing difficulty, poor playability

- | | |
|--|---|
| <ul style="list-style-type: none"> ● Measuring equipment/
jigs ● Measuring point ● Test disc and setting ● Adjustment position | <ul style="list-style-type: none"> • Oscilloscope • RFO • SONY TYPE 4 (or TYPE 3) • Normal mode • VR6 (FEB) |
|--|---|

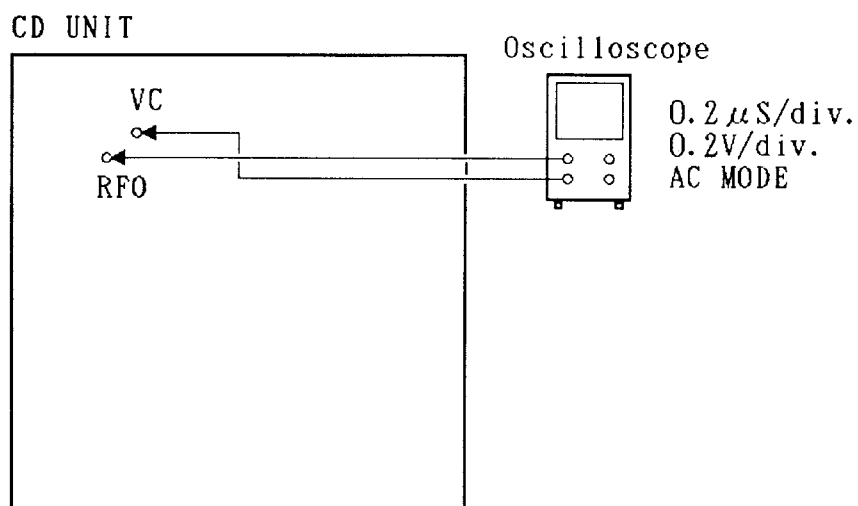


Fig. 31

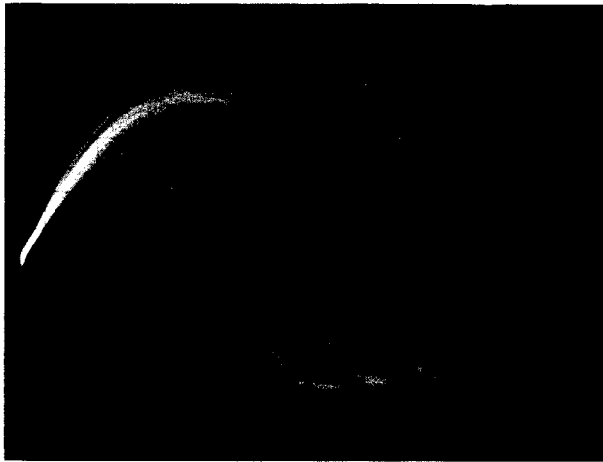
Adjustment Procedure

1. Play tune TNO 12 in normal mode. (TYPE 3: TNO 14)
2. Observe RFO in respect to VC in the oscilloscope, and adjust VR6 (FEB) to obtain maximum RF and optimum eye pattern. (See Fig. 32 and 33)



OK

Fig. 32



0.2 μ s/div.
0.2V/div.
AC Mode

Before adjustment

Fig. 33

2.10 Focus Servo Loop Gain Adjustment

- Purpose: To adjust the focus servo loop gain to an optimum value
 - Maladjustment symptoms: Poor playability, reduced resistance to vibration, focus closure fails readily
- | | |
|---|---|
| <ul style="list-style-type: none"> ● Measuring equipment/jigs ● Measuring point ● Test disc and setting ● Adjustment position | <ul style="list-style-type: none"> • Oscillator, gain adjustment filter (GGF-065), dual meter milli-voltmeter • FEX, FEY • SONY TYPE 4 (or TYPE 3) • Normal mode • VR7 (FG) |
|---|---|

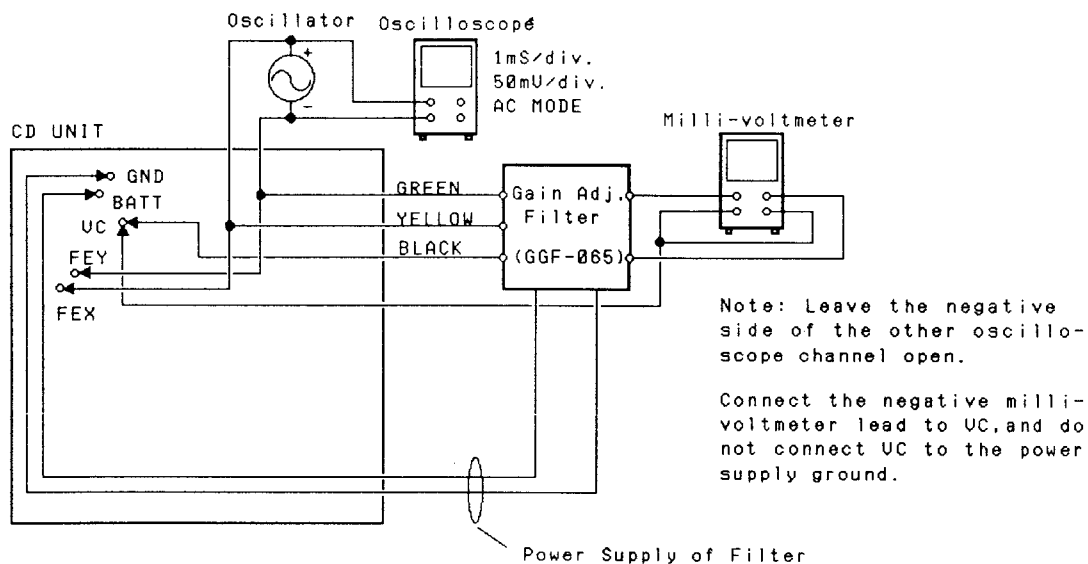


Fig. 34

Adjustment Procedure

1. After checking that the power is OFF, connect the gain adjustment filter and measuring equipment as shown in the above diagram.
2. Play tune TNO 12 in normal mode. (TYPE 3: TNO 14)
3. Set the oscillator to 1kHz, and observe the FEX/FEY output in the oscilloscope. Adjust the oscillator output to obtain a FEX/FEY output of 100mVp-p.
4. Adjust VR7 (FG) to obtain a milli-voltmeter difference of $0 \pm 0.5\text{dB}$.

2.11 Tracking Servo Loop Gain Adjustment

- Purpose: To adjust the tracking servo loop gain to an optimum value
- Maladjustment symptoms: Poor playability, reduced resistance to vibration

- | | |
|---|---|
| <ul style="list-style-type: none"> ● Measuring equipment/jigs ● Measuring point ● Test disc and setting ● Adjustment position | <ul style="list-style-type: none"> • Oscillator, gain adjustment filter (GGF-065), dual meter milli-voltmeter • TEX, TEY • SONY TYPE 4 (or TYPE 3) • Normal mode • VR8 (TG) |
|---|---|

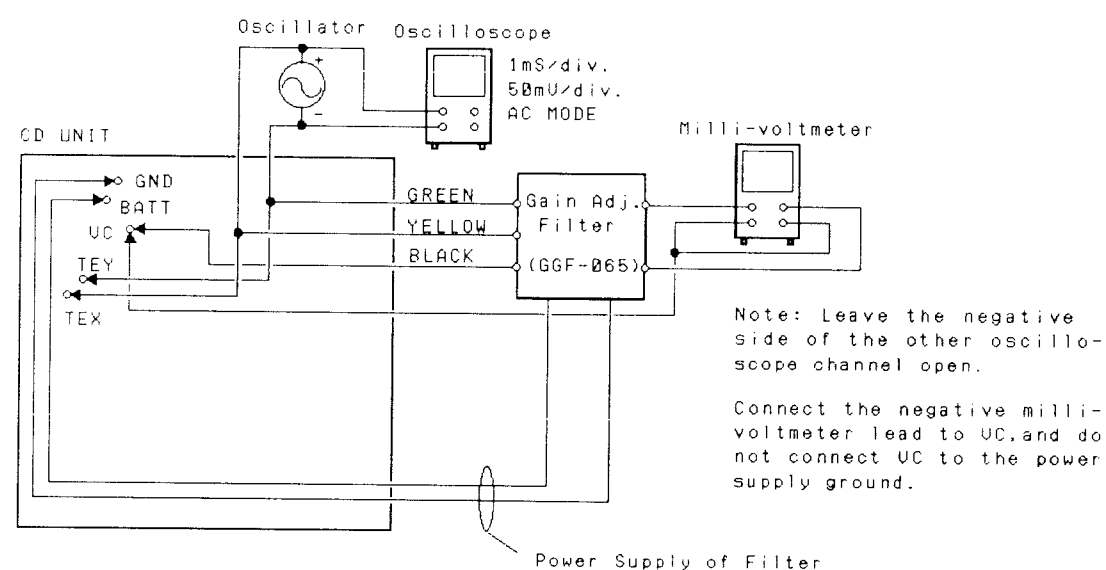


Fig. 35

Adjustment Procedure

1. After checking that the power is OFF, connect the gain adjustment filter and measuring equipment as shown in the above diagram.
2. Play tune TNO 12 in normal mode. (TYPE 3: TNO 14)
3. Set the oscillator to 1.4kHz, and observe the TEX/TEY output in the oscilloscope. Adjust the oscillator output to obtain a TEX/TEY output of 100mVp-p.
4. Adjust VR8 (TG) to obtain a milli-voltmeter difference of 0 ± 0.5 dB.

2.12 TE Offset Adjustment- II

- Purpose: To adjust the electrical offset of the tracking servo to zero.
- Maladjustment symptoms: Search times too long, carriage run-away

- | | |
|---|---|
| <ul style="list-style-type: none"> ● Measuring equipment/jigs ● Measuring point ● Test disc and setting ● Adjustment position | <ul style="list-style-type: none"> • DC voltmeter • TA0 low-pass filter output • Empty magazine • Test mode • VR4 |
|---|---|

Adjustment Procedure

Same as for TE offset adjustment-I, but with the DC voltage of the TA0 LPF output adjusted to 0 ± 50 mV.

The purpose of this additional adjustment is to correct any deviations generated when carrying out the tracking balance and tracking servo loop gain adjustments after completing TE offset adjustment-I.

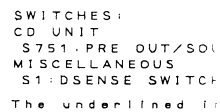
2.12 TE Offset Adjustment- II

<ul style="list-style-type: none">● Purpose: To adjust the electrical offset of the tracking servo to zero.● Maladjustment symptoms: Search times too long, carriage run-away	
<ul style="list-style-type: none">● Measuring equipment/ jigs● Measuring point● Test disc and setting● Adjustment position	<ul style="list-style-type: none">• DC voltmeter• TAO low-pass filter output• Empty magazine • Test mode• VR4
<p>Adjustment Procedure</p> <p>Same as for TE offset adjustment- I, but with the DC voltage of the TAO LPF output adjusted to $0 \pm 50\text{mV}$.</p> <p>The purpose of this additional adjustment is to correct any deviations generated when carrying out the tracking balance and tracking servo loop gain adjustments after completing TE offset adjustment- I.</p>	

2.13 Tracking Balance Adjustment- II

<ul style="list-style-type: none">● Purpose: To adjust the tracking servo offset to zero.● Maladjustment symptoms: Search times too long, poor playability, carriage run-away	
<ul style="list-style-type: none">● Measuring equipment/ jigs● Measuring point● Test disc and setting● Adjustment position	<ul style="list-style-type: none">• Oscilloscope• TEY low-pass filter output• SONY TYPE 4 (or TYPE 3) • Test mode• VR5
<p>Adjustment Procedure</p> <p>Steps 1 thru 5 same as tracking balance adjustment- I.</p> <p>6. Check that the level difference between the positive and negative amplitudes of the TEY signal is within 5% (See Fig. 10-12). If greater than 5%, adjust with VR5.</p> <p>7. If further adjustment was necessary in step 6, repeat TE offset adjustment- II.</p>	

Fig. 35



4. CONNECTION DIAGRAM

● **CD Unit**

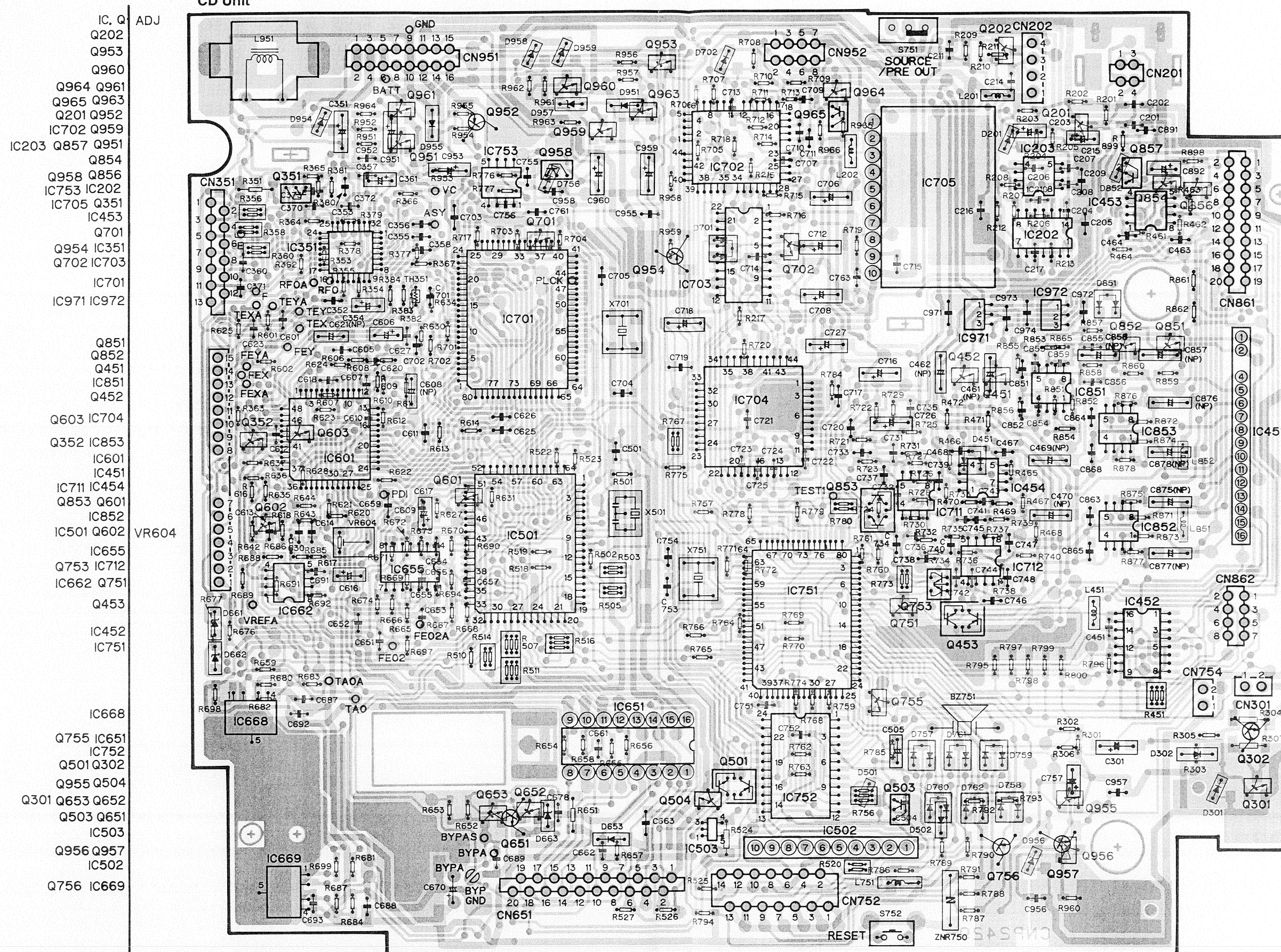


Fig. 37

5. CHASSIS EXPLODED VIEW

(Page 75)

NSP: Non spare part

	DEX-M88/US	DEX-M88RDS/EW	
Mark No. Description	Part No.	Part No.	Note
1 Display Assy 26 Grille Unit 45 Button 46 Button 82 Remote Control Assy	CXA3692 CXA3558 CAC2603 CAC2604 CXA3708	CXA3691 CXA3556 CAC2605 CAC2606 CXA3573	B → TA CLOCK → AF
86 Power Supply Unit 112 CD Unit 116 Chassis Unit 122 Cap	CWR1027 CWX1320 NSP CNV1455	CWR1028 CWX1321 NSP CNV2679	

6. PACKING METHOD

(Page 82)

NSP: Non spare part

	DEX-M88/US	DEX-M88RDS/EW	
Mark No. Description	Part No.	Part No.	Note
1 Carton 2-2 Card 2-3 Owner's Manual Owner's Manual 3 Accessory Assy 3-3 Holder (×1) 3-6 Screw (×1) 4 Cord 8 Remote Control Assy 11 Contain Box	CHG1848 NSP CRB1186 ---- CEA1581 NSP PMS20P040FZK CDE2901 CXA3708 CHL1848	CHG1846 NSP CRD1394 CRD1474 CEA1644 ---- ---- CDE2897 CXA3573 NSP	

*Owner's Manual

Part No.	Language
CRD1394	English, French, German, Spanish
CRD1474	Swedish, Norwegian, Dutch, Italian, Finnish